CLAIMS

1. A rotating electric machine of a type with rotating field circuit, which machine is intended for direct connection to a distribution or transmission network, **characterized** in that at least one electric winding of the machine comprises at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, a solid insulating layer surrounding the first layer, and a second layer with semiconducting properties surrounding the insulating layer, and in that a detecting circuit is provided for detecting earth faults in the rotating field circuit.

2. A machine as claimed in claim 1, **characterized** in that the potential of the first layer is substantially similar to the potential of the conductor.

3. A machine as claimed in claim 1 or claim 2, **characterized** in that the second layer is arranged to form a substantially equipotential surface surrounding the conductor.

4. A machine as claimed in claim 3, **characterized** in that the second layer is connected to a predetermined potential.

5. A machine as claimed in claim 4, **characterized** in that said predetermined potential is earth potential.

6. A machine as claimed in any of the preceding claims, **characterized** in that at least two adjacent layers of the machine winding have substantially the same coefficients of thermal expansion.

7. A machine as claimed in any of the preceding claims, **characterized** in that the conductor comprises a number of strands, at least some of which are in electrical contact with each other.

8. A machine as claimed in any of the preceding claims, **characterized** in that each of said three layers is firmly joined to adjacent layers along substantially its whole contact surface.

9. A machine as claimed in any of the preceding claims, **characterized** in that said layers are arranged to adhere to each other even when the insulated conductor is bent.

10. A rotating electric machine of a type with rotating field circuit, which machine is intended for direct connection to a distribution or transmission network, **characterized** in that at least one winding of the machine is formed of a cable comprising one or more current carrying conductors, each conductor having a number of strands, an inner semiconducting layer arranged around each conductor, an insulating layer of solid insulating material arranged around said inner semiconducting layer, and an outer semiconducting layer arranged around the insulating layer, and in that a detecting circuit is arranged to detect earth faults in the rotating field circuit.

11. A machine as claimed in claim 10, **characterized** in that said cable comprises a sheath.

12. A machine as claimed in any of the preceding claims, **characterized** in that an excitation system for supplying the field circuit comprises a part rotating with the field circuit, and in that an injection and measuring unit for said detecting circuit is arranged in said rotating part.

13. A machine as claimed in any of the preceding claims, **characterized** in that the detecting circuit comprises an injection circuit for application on a measuring circuit that is closed through the impedance between field winding and earth, an injection voltage and a measuring unit for measuring the error current resulting in said measuring circuit from the injection voltage, and in that rectifier units are arranged to form rectified absolute values of the injection voltage and the

error current, a wireless communication unit also being provided to transmit said absolute values to a stationary calculating unit for monitoring the resistance of the field winding to earth.

14. A machine as claimed in claim 13, wherein the excitation system is supplied from an exciter with rotating stator side, **characterized** in that the injection circuit is supplied from the rotating stator side of the exciter.

15. A machine as claimed in claim 13 or claim 14, **characterized** in that filter circuits are arranged in said measuring circuit in order to filter away harmonics and to block direct voltages.

16. A machine as claimed in any of claims 13-15, **characterized** in that a comparator is arranged to compare said absolute values of the error current with predetermined limit values and, depending on the result of the comparison, to trip alarms.

17. A machine as claimed in claim 16, **characterized** in that scaling units are arranged prior to the comparator in order to normalise and compensate the measured error current for variations in the injection voltage before the error current is supplied to the comparator.

18. A machine as claimed in any of the preceding claims, **characterized** in that measuring means are arranged to measure the voltage and current of the field winding and transmit these values to a unit for calculating the rotor temperature.

19. A machine as claimed in claim 18, **characterized** in that the unit for calculating the rotor temperature is stationary and in that said measured voltage and current values for the field winding can be transmitted to said calculating unit via the wireless communication unit.

20. A machine as claimed in claim 18 or claim 19, **characterized** in that an alarm is connected to the calculating unit which alarm is tripped when the temperature exceeds a predetermined limit value.

21. A machine as claimed in claim 13, **characterized** in that a stationary voltage source is arranged to supply the injection circuit via a ring transformer.

22. A machine as claimed in claim 13, **characterized** in that the injection circuit is supplied from a constant voltage source.

23. A method for a rotating electric machine of a type with rotating field circuit, which machine is intended for direct connection to a distribution or transmission network, wherein at least one electric winding of the machine comprises at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, a solid insulating layer surrounding the first layer, and a second layer with semiconducting properties surrounding the insulating layer, **characterized** in that an injection voltage is supplied to a measuring circuit that is closed through the impedance between field winding and earth, and the resulting error current in the measuring circuit is measured, whereupon rectified absolute values of the injection voltage and the error current are formed and transmitted to a calculating unit for monitoring the resistance of the field winding to earth.

24. A method as claimed in claim 23, **characterized** in that harmonics in the measuring circuit are filtered away.

25. A method as claimed in 23 or claim 24, **characterized** in that said absolute values of the error current are compared with predetermined limit values and an alarm is tripped depending on the result of the comparison.

26. A method as claimed in claim 25, **characterized** in that prior to the comparison, the error current measured is normalised and compensated for variations in the injecting voltage.

27. A method for a rotating electric machine of a type with rotating field circuit, which machine is intended for direct connection to a distribution or transmission network, wherein at least one electric winding of the machine comprises at least one electric conductor, a first layer with semiconducting properties surrounding the conductor, a solid insulating layer surrounding the first layer, and a second layer with semiconducting properties surrounding the insulating layer, **characterized** in that the voltage and current of the field winding are measured and the rotor temperature is calculated from these measured values.